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LEFT VENTRICULAR SYSTOLIC STRAIN PREDICTS SUBSEQUENT HEART FAILURE: A COMMUNITY STUDY

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Background: Heart failure is an increasingly prevalent condition that grows in incidence with advancing age. Whether systolic strain, a sensitive measure of myocardial function, identifies those predisposed to subsequent heart failure is unclear.

Methods: Participants enrolled in the Olmsted County Heart Function Study; a random selected sampling of community subjects who underwent clinical and echocardiographic evaluation between 2001-2004. A random subset of participants (n=301) had assessment of longitudinal left ventricular (LV) systolic strain (Velocity vector imaging, Siemens). Subjects were followed for the development of heart failure over a further 6.3±2.3 years. No subject had a history of heart failure at the time for echocardiography.

Results: The average age was 66±10 years. 51% were female. The prevalence of hypertension and diabetes were 46%, 14% respectively. The mean LV ejection fraction was 67±7. Average global LV longitudinal strain was -19.5±3%. Strain declined with increasing age (1±3% per decade; $p<0.001$) and was lower in men (-18.7±2.8%) than women (-20.4±3.1%). These associations persisted after adjusting for the presence of hypertension. LV strain was lower in those with diastolic dysfunction (-19.3±3%) compared to those with normal diastolic function (-20.2±3%). Global LV longitudinal systolic strain was associated with the development of incident heart failure; for every 3% decline in strain there was a 3.23-fold increased risk of heart failure (95% CI 2.05-5.13, $p<0.001$). The association of LV strain with heart failure persisted after adjustment for age, hypertension, diabetes and diastolic dysfunction (hazard ratio 2.77, 95% CI, 1.72-5.54, $p<0.001$).

Conclusion: In a community-based cohort, global left ventricular systolic strain declines with age and can predict those at risk for the development of subsequent heart failure.